



Imperial College  
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## Estimating male circumcision coverage in South Africa

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# INTRODUCTION

- ▶ HIV continues to pose major public health challenges, particularly in the developing world.
- ▶ HIV-related deaths continue to dominate in most of sub-Saharan Africa.
- ▶ Voluntary medical male circumcision (VMMC) used as an intervention to reduce HIV transmission
  - ▶ Up to 60% reduction in female to male transmission

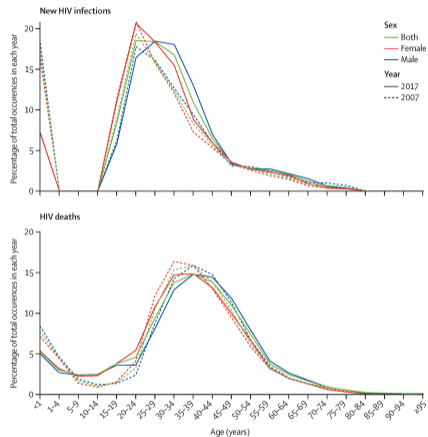


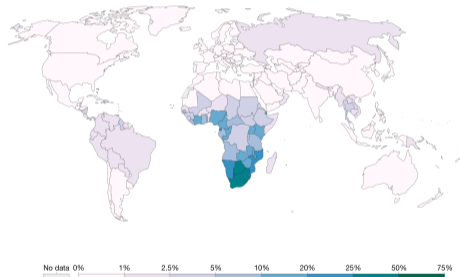
Figure: Percentage of deaths and new cases of HIV occurring in each age group, by sex, 2007 and 2017 (Figure 2 from James S. L., *et al.* (2019))

## INTRODUCTION

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Share of deaths from HIV/AIDS, 2017

Our World  
in Data



Source: IHME, Global Burden of Disease

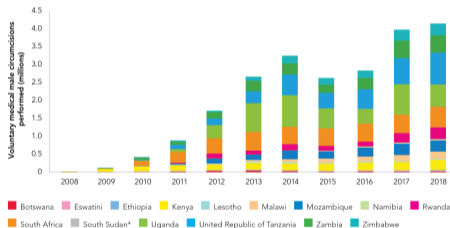
OurWorldInData.org/hiv-aids • CC BY

# OBJECTIVES

- ▶ Scale up in VMMC programmes
  - ▶ South Africa identified as a priority country
- ▶ Estimates male circumcision (MC) coverage are required
  - ▶ VMMC programme planning and target setting.
  - ▶ Evaluate the effectiveness of VMMC campaigns to date
- ▶ Two sources of data
  - ▶ Survey data
  - ▶ Programme data

## Voluntary male medical circumcisions rising

Annual number of voluntary medical male circumcisions, 15 priority countries, 2008–2018



\*South Sudan has only recently initiated a pilot voluntary medical male circumcision programme, and data were reported for the first time in 2018. This is the reason for low numbers.

Source: 2019 Global AIDS Monitoring.

## CHALLENGES

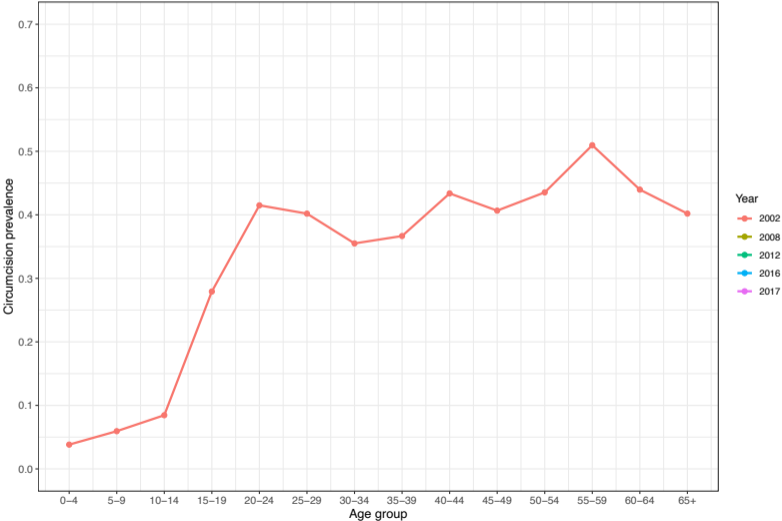
- ▶ Two types of MC
  - ▶ Medical male circumcision (MMC)
  - ▶ Circumcision in traditional male initiation ceremonies (TMIC)

		Who performed the circumcision?		
		Healthcare Professional	Spiritual/Religious Leaders	Missing
Where performed?	Hospital or Clinic	MMC	MMC	MMC
	Home, Camp, School or Bush	MMC	TMIC	TMIC
	Missing	MMC	TMIC	Excluded

## CHALLENGES

- ▶ Evidence that TMIC provides the same protective effect as MMC is mixed
- ▶ Initiative to perform TMICs using medical methods (MMC-Ts)
- ▶ How do we put all this together?

# ESTIMATING CIRCUMCISION RATES

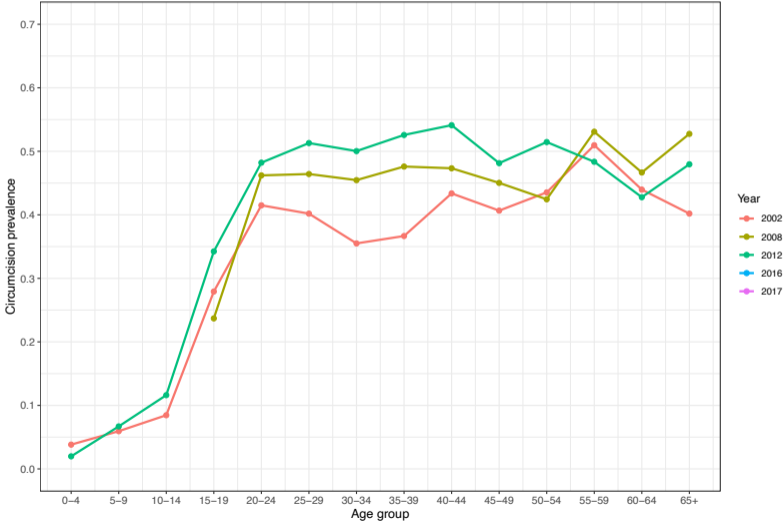


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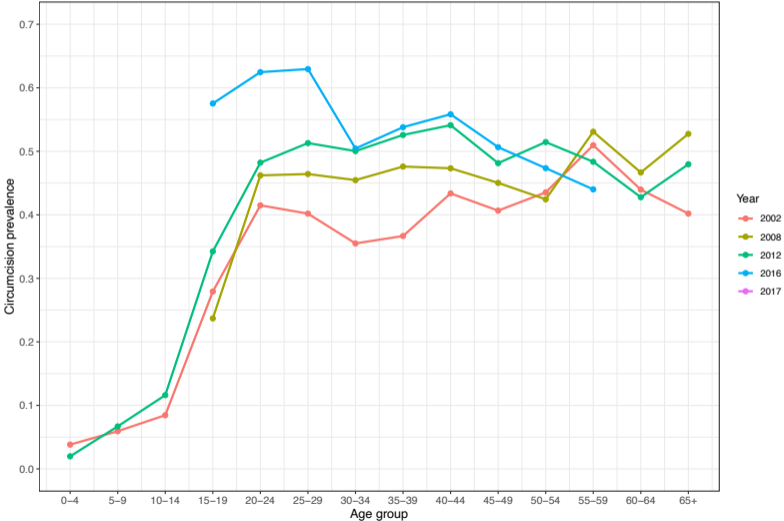




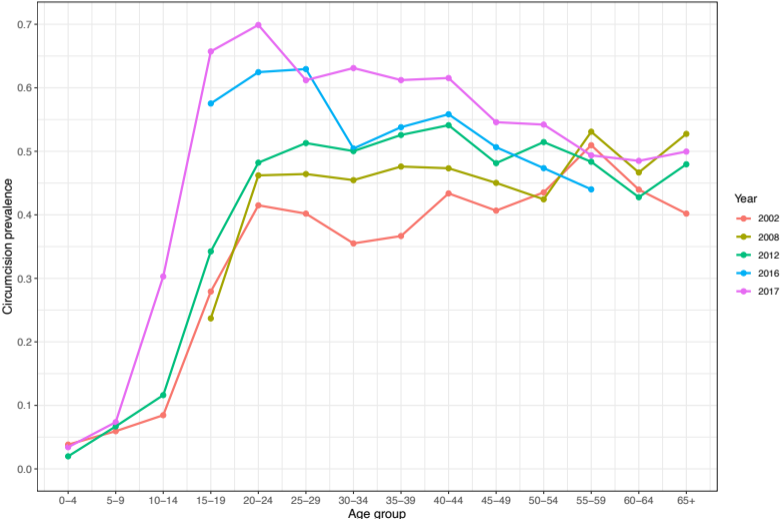
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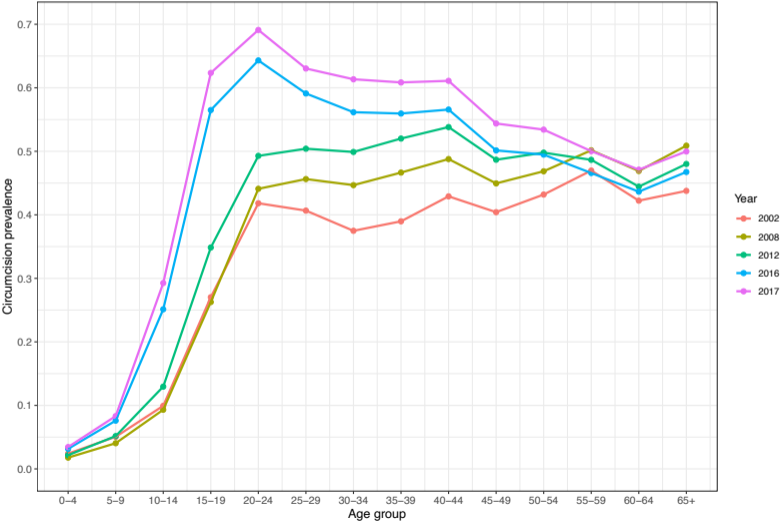
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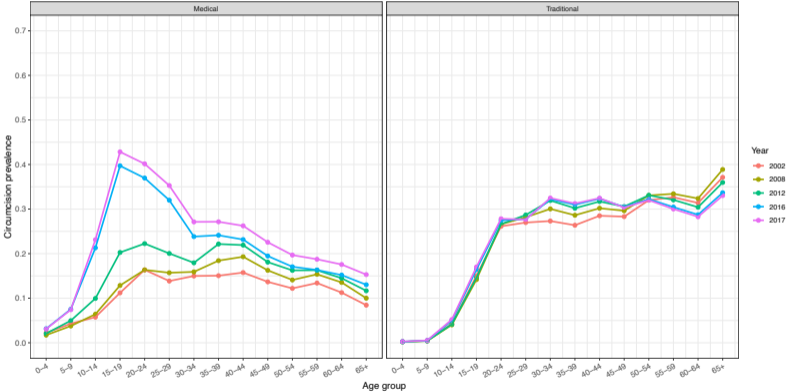
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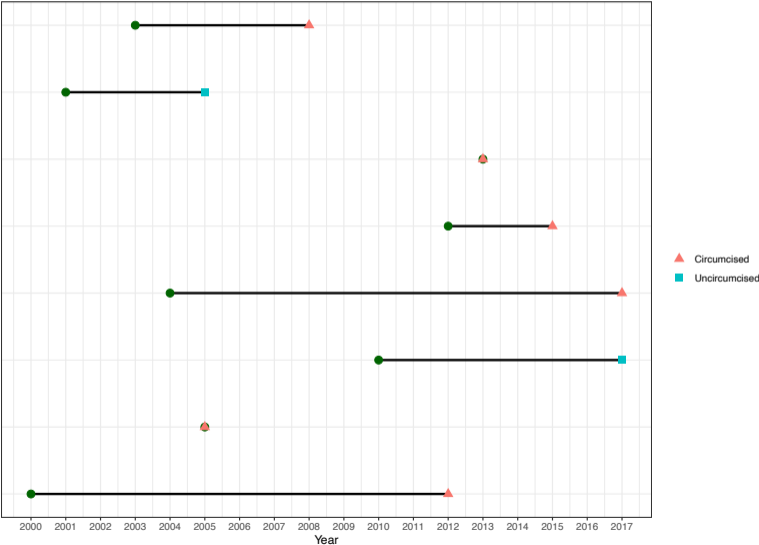
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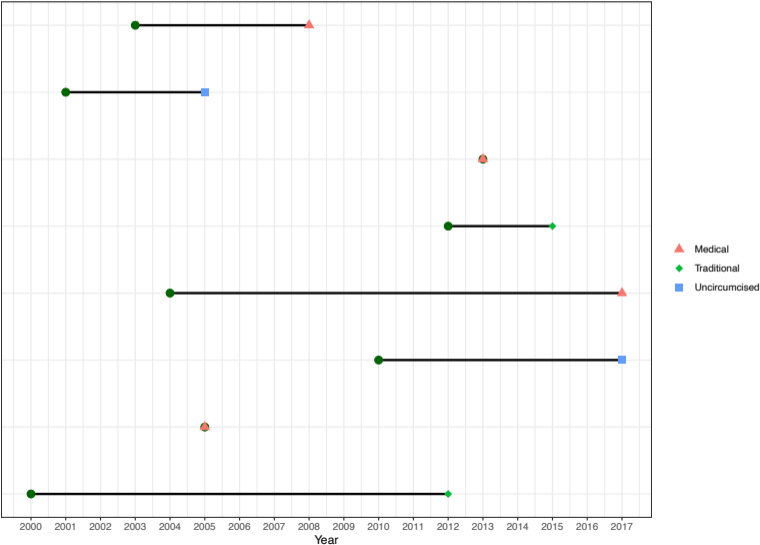
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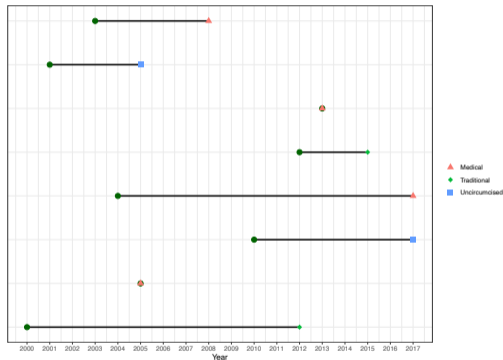


# ESTIMATING CIRCUMCISION RATES



# MODEL

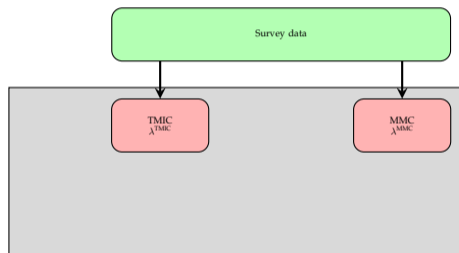
- ▶ Estimate annual probability of becoming circumcised.
- ▶ Survival analysis
  - ▶ By district / age / year
  - ▶ Survey data
  - ▶ Multiple competing risks
  - ▶ TMIC and MMC modelled separately
- ▶ Followed from birth until circumcision or censoring
- ▶ No circumcision over the age of 59





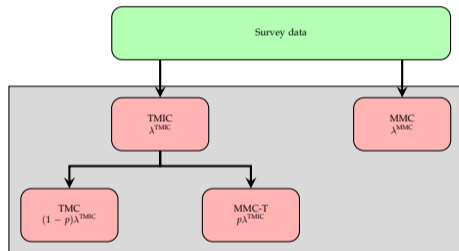
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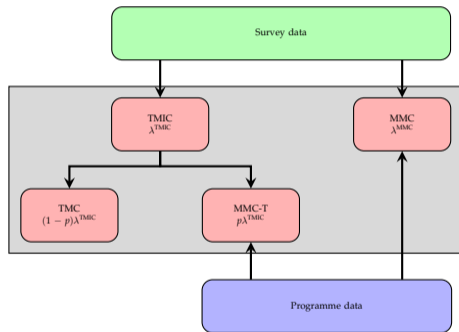
# MODEL

- ▶ Move to perform TMICs using medical methods
  - ▶ Further split of TMIC into MMC-T and TMC
  - ▶ Proportions determined if there is evidence or local knowledge



# MODEL

- ▶ Model extended to include programme data
  - ▶ Number of circumcision aged 10+
  - ▶ MMCs and MMC-Ts
  - ▶ Poisson distribution



## SURVEY DATA

- ▶ Household survey data
  - ▶ South Africa National HIV Prevalence, Incidence, Behavior and Communication Survey 2002, 2008, 2012, 2017
  - ▶ Demographic and Health Survey 2016
- ▶ Variables extracted
  - ▶ Demographics
  - ▶ Ever been circumcised (self-reported)
  - ▶ Age at circumcision
  - ▶ Where the circumcision was performed
  - ▶ Who performed the circumcision

## SURVEY DATA

- ▶ Classification of MMC and TMIC
- ▶ Based on two questions in the survey
  - ▶ Where was the circumcision performed?
  - ▶ Who performed the circumcision?

		Who performed the circumcision?		
		Healthcare Professional	Spiritual/Religious Leaders	Missing <sup>†</sup>
Where performed?	Hospital or Clinic	MMC	MMC	MMC
	Home, Camp, School or Bush	MMC	TMIC	TMIC
	Missing <sup>††</sup>	MMC	TMIC	Excluded

<sup>†</sup> Question unavailable in HSRC 2002 survey, <sup>††</sup> Question unavailable in DHS 2016 survey

## PROGRAMME DATA

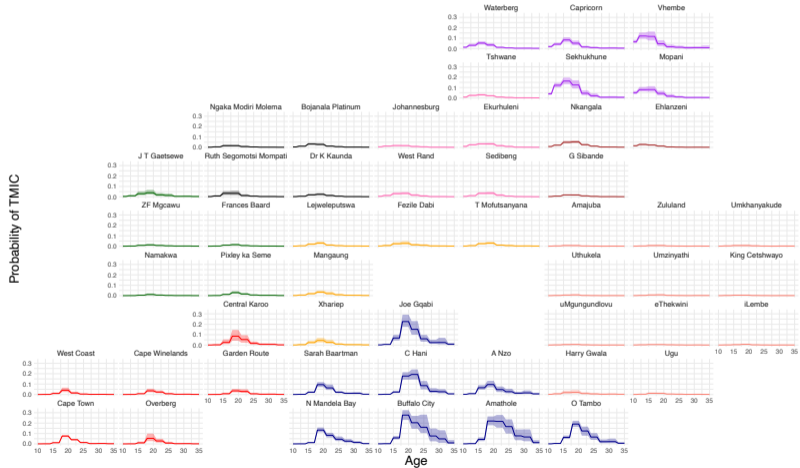
- ▶ VMMC programme data
  - ▶ Number of VMMC for HIV prevention
  - ▶ Men ages 10+
  - ▶ Aligned to SA Government fiscal year
- ▶ South Africa NDoH DHIS2 primary source for VMMC programme data (2013–2020)
- ▶ Supplemented by:
  - ▶ District inputs to DMPPT2 tool (2010-2012)
  - ▶ Eastern Cape: PEPFAR data capturing MMC conducted in TMI setting (MMC-T; 2018–2020)

## PROGRAMME DATA

- ▶ Assumed proportions of TMICs conducted as MMC-Ts
  - ▶ Nkangala: around 90% between 2013-2019
  - ▶ Mpumalanga and Limpopo: around 20% (in 2015), 40% (in 2016), 60% (in 2017), 80% (in 2018), 90% (in 2019)
  - ▶ Eastern Cape and Cape Town: around 99% in 2018 and 2019
  - ▶ In all other districts: no MMC-Ts
- ▶ It is assumed no MMC-Ts are taking place in 2020 and 2021, due to the suspension of the VMMC programmes as a result of the COVID-19 pandemic.

# RESULTS

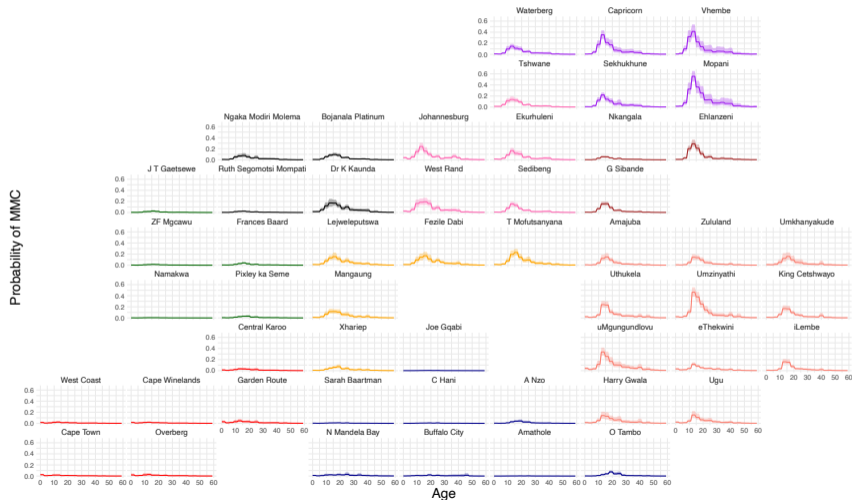
## Traditional circumcision (All ages)





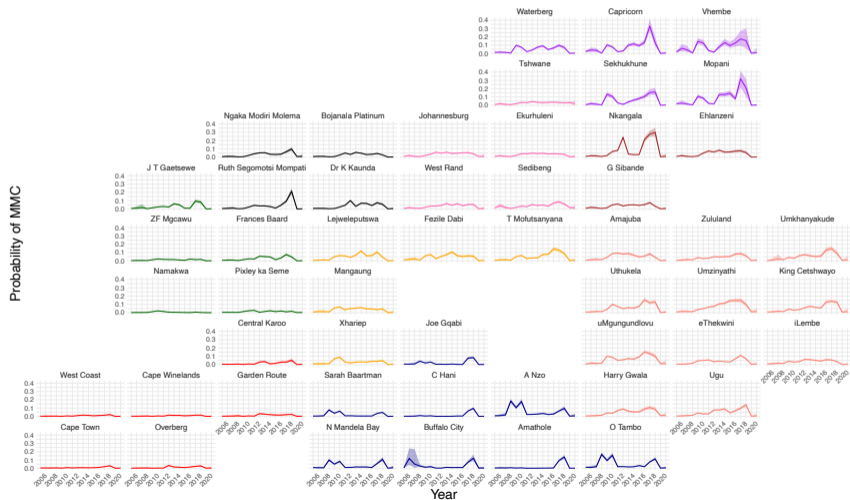
# RESULTS

## Medical circumcision (2016, All ages)



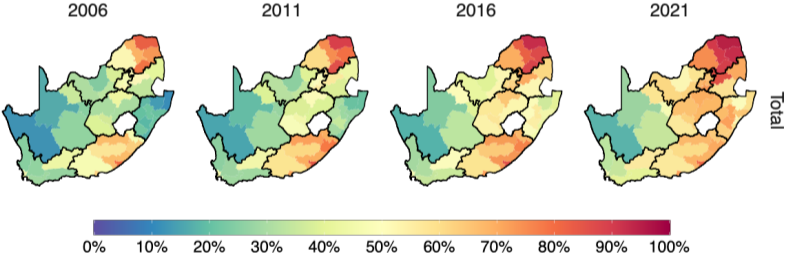
# RESULTS

## Medical circumcision (2010–2020, 15–49)



# RESULTS

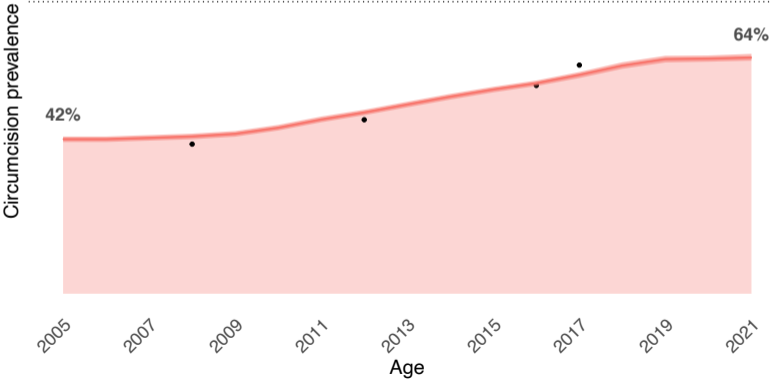
## Circumcision coverage (15–49)



RESULTS

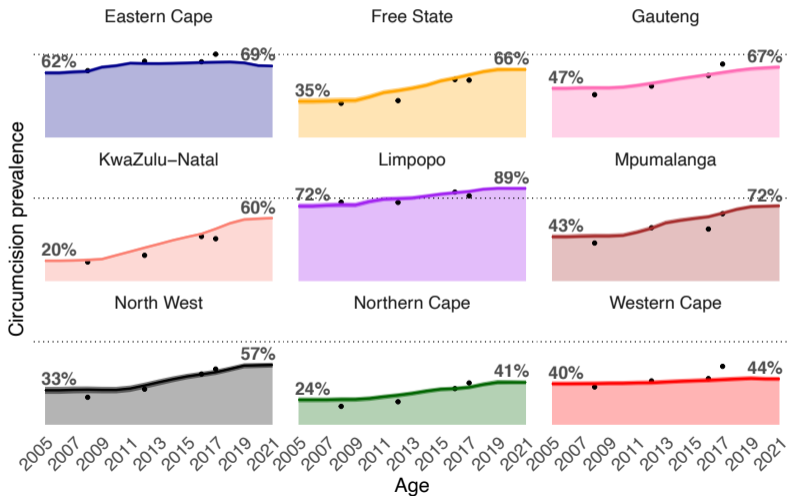
# Circumcision coverage (Total, 15–49)

South Africa



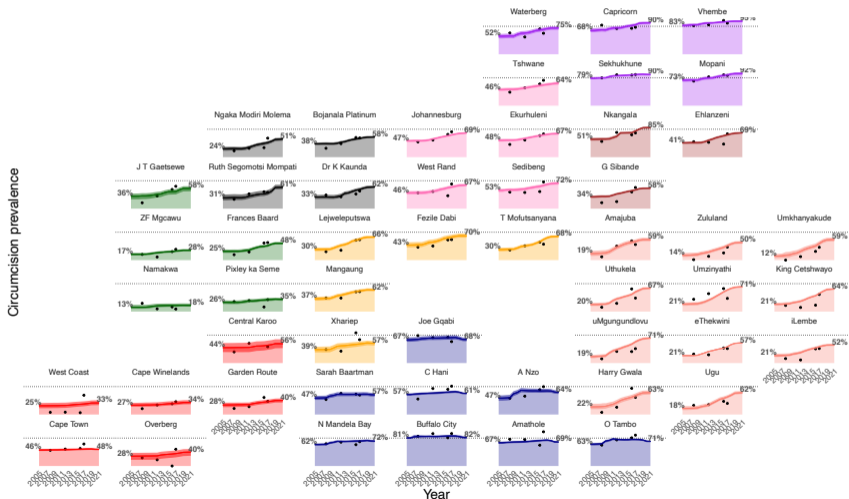
# RESULTS

## Circumcision coverage (Total, 15–49)



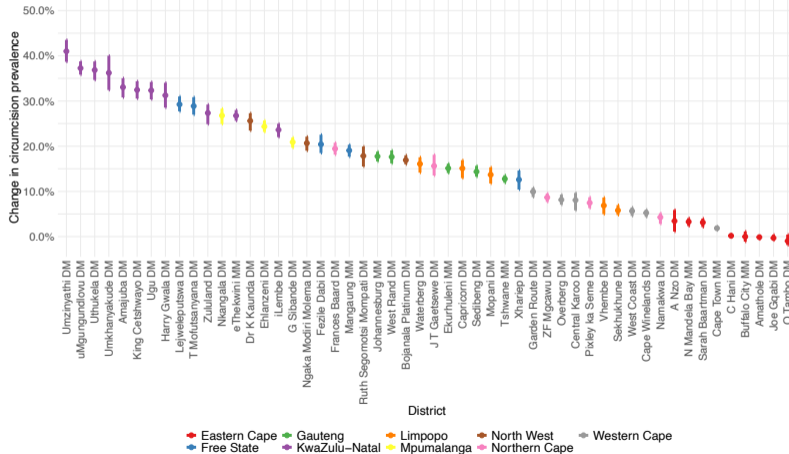
# RESULTS

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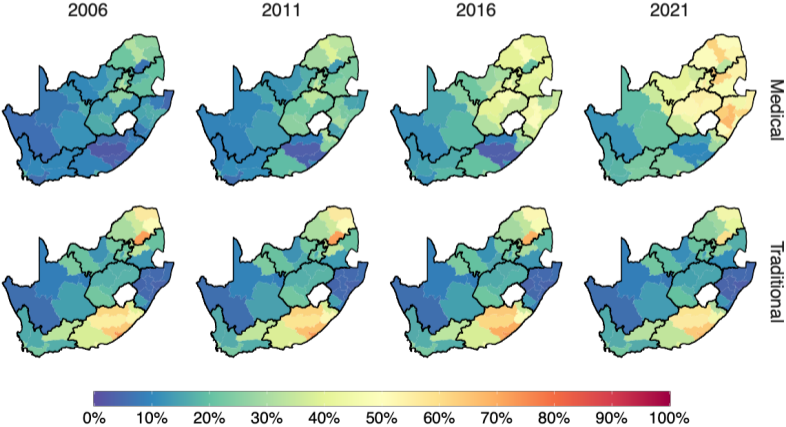
# RESULTS

Absolute change in coverage between 2010 and 2020 (15–49)



# RESULTS

## Circumcision coverage (15–49)

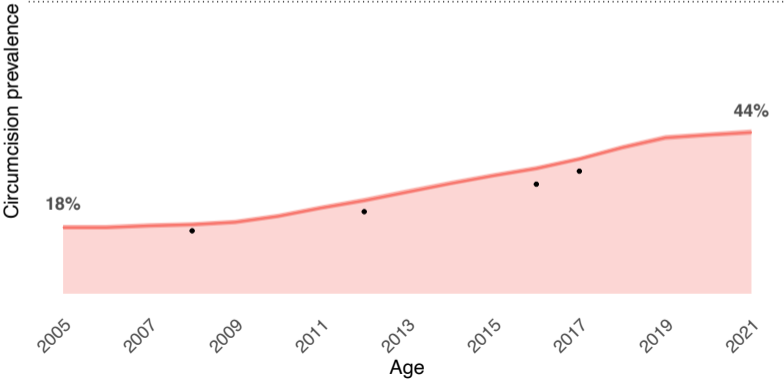




RESULTS

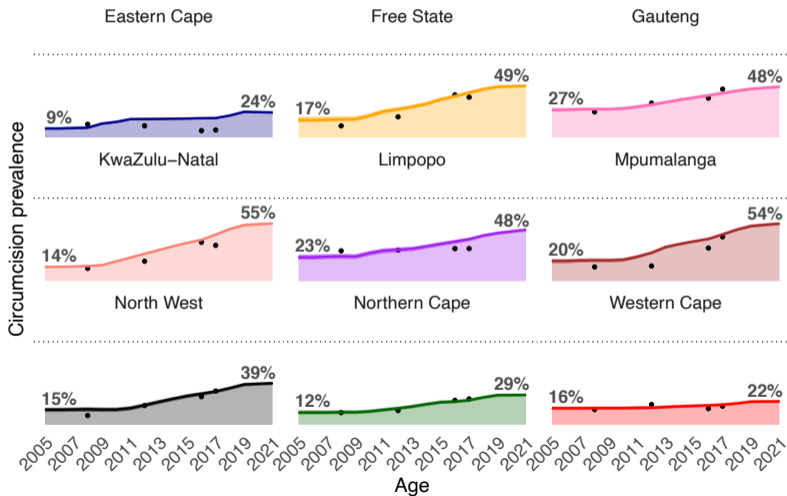
# Circumcision coverage (Medical, 15–49)

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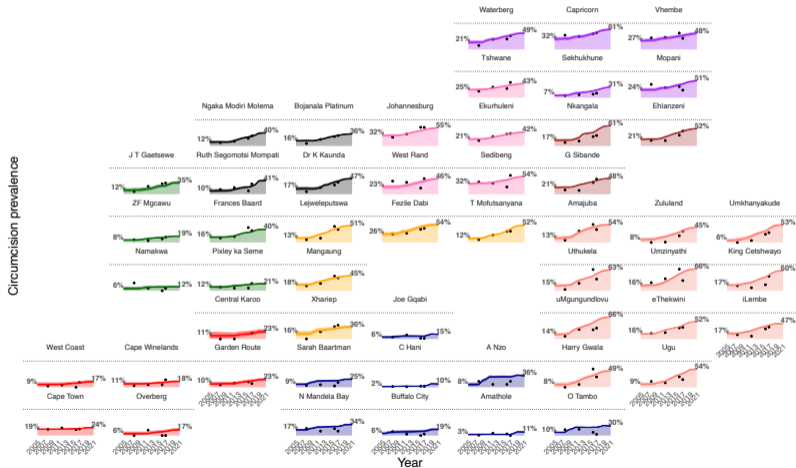
# RESULTS

## Circumcision coverage (Medical, 15–49)



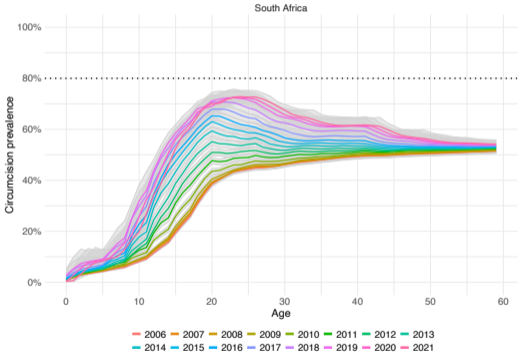
# RESULTS

## Circumcision coverage (Medical, 15–49)

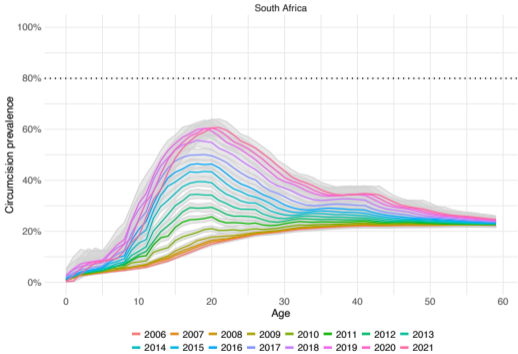


# RESULTS

### Circumcision coverage (Total, All ages)

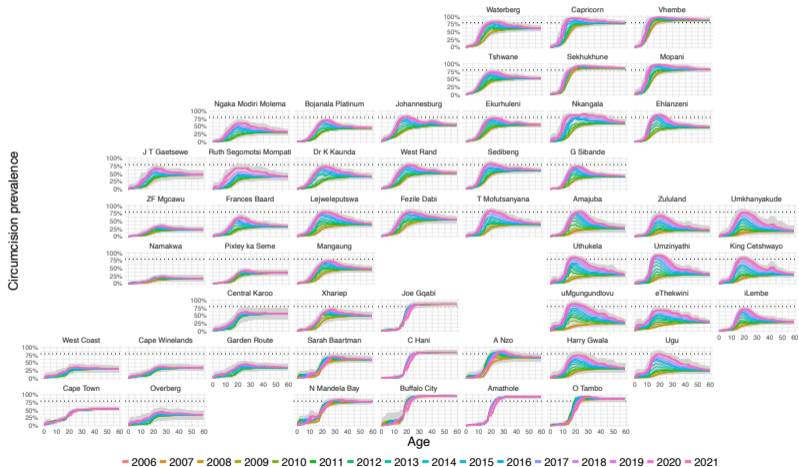


### Circumcision coverage (Medical, All ages)



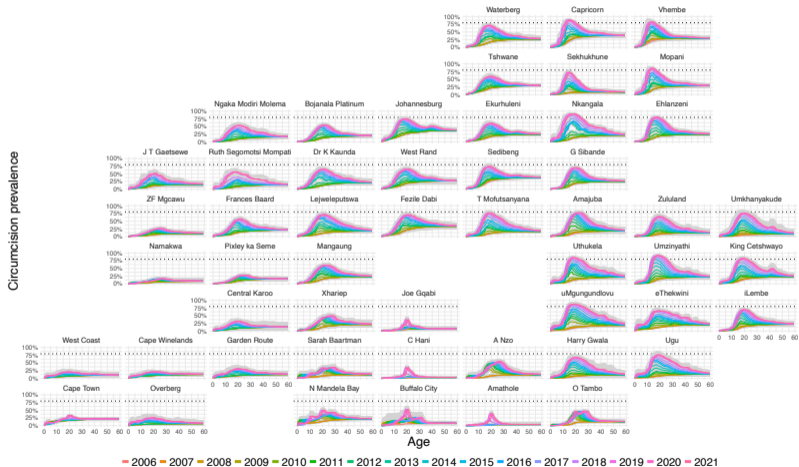
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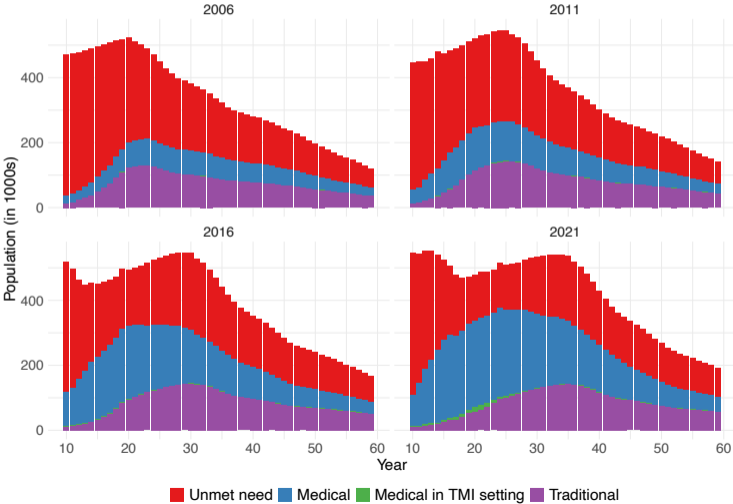
# RESULTS

## Circumcision coverage (Medical, All ages)



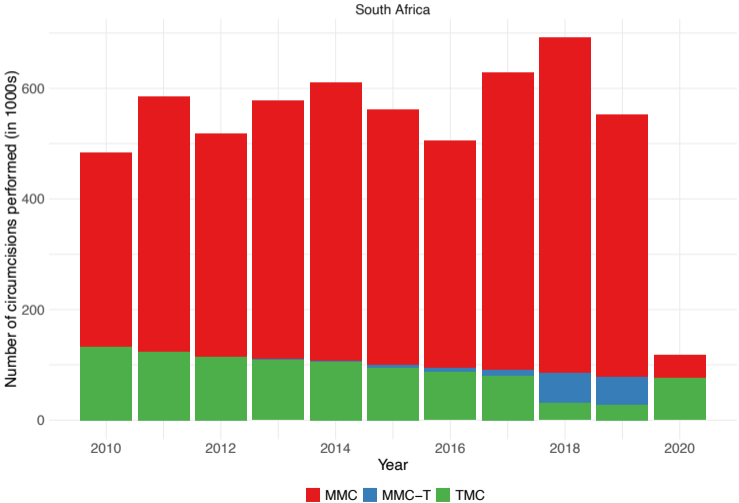
# RESULTS

## Population by type of circumcision (All ages)



# RESULTS

## MCs conducted (By type, 10+)





## SUMMARY

- ▶ Produced a model that estimates circumcision probabilities and coverage in South Africa.
  - ▶ Type
  - ▶ Space
  - ▶ Age
  - ▶ Time
- ▶ Model integrates and calibrates data from multiple sources
- ▶ Accounts for changing dynamic in the TMIC
- ▶ Future work
  - ▶ VMMC programme planning and target setting
  - ▶ Evaluate the effectiveness of VMMC campaigns on incidence of HIV

THANK YOU, ANY QUESTIONS?

